CLAIMS

1. A cap for use on palletised loads, the cap being of the type having at least two strapping strands retractable into housings through openings at opposite sides of the cap, spring means within the housings for retracting the strapping strands, hooks on the free ends of the strapping strands for engagement with the underside of the platform of a pallet, tensioning means within the housings for tightening the strapping strands between the cap and the pallet after interposing a load between the cap and the pallet, and stop means for limiting retraction of the hooks into the housings when not engaged with a pallet, characterized in that each tensioning means comprises a slotted crossbar through which the strapping strand passes, a lever pivoted within the respective side of the cap and movable in a plane parallel to the general plane of the cap between operative and inoperative positions, and linkage between the lever and the slotted crossbar such that movement of the lever from inoperative position to operative position causes rotation of the slotted crossbar to wind the strapping strand round the slotted crossbar, thus enabling tension to be developed in the strapping strand after its hook has been engaged with a pallet, together with manually releasable spring-loaded latch means for securing the strapping strand in tension.

2. A cap as in Claim 1, characterized in that the latch means also holds the lever in inoperative position.

3. A cap as in Claim 1, characterized in that a return spring urges the lever to inoperative position.

4. A cap as in any one of Claims 1 to 3, characterized in that the axis of rotation of the slotted crossbar is at the middle of the slot.

5. A cap as in any one of Claims 1 to 3, characterized in that the slotted crossbar is formed by a pair of parallel bars rigidly connected at both ends.

6. A cap as in Claim 5, characterized in that the axis of rotation is at the middle of one of the bars, whereby the other bar orbits round it.

7. A cap as in any one of Claims 1 to 6, characterized in that the linkage comprises at least one wire secured at one end to the lever and secured at the other end to a pulley secured for rotation with the slotted crossbar, movement of the lever from inoperative position to operative position effecting unwinding of the wire from the pulley to cause winding of the strapping strand round the slotted crossbar, and with a spring return for re-winding the wire onto the pulley when the lever is moved to effect release of tension in the wire.

8. A cap as in any one of Claims 1 to 7, characterized in that a ratchet mechanism is incorporated in the linkage between the lever and the slotted crossbar, to enable repeated swinging of the lever to-and-fro to effect as many turns of the strapping strand round the slotted crossbar as may be needed for adequate tensioning of the strapping strand and hold the tension.

9. A cap as in Claim 8, characterized in that the lever and ratchet mechanism is in the form of a well-known type of device for tensioning a strap for securing a load on a lorry or a strap on a side sheet for protecting a load on a lorry, in which device the strap is wound round a spool between two arms of a bifurcated lever, a ratchet being provided between each end of the spool and the respective adjacent arm, the lever arms and spool and ratchets being mounted on a common pivot in a mounting frame, with the ratchets secured for rotation with the spool and the lever rotatable with respect to the spool and ratchets, a drive plate slidably

mounted on the lever, a first spring urging the drive plate into engagement with the ratchet to enable to-and-fro swinging of the lever to wind the strap round the spool and tension it, a second spring urging the latching plate into engagement with the ratchet to latch the ratchet at times when it is not being rotated by driving action of the lever through the drive plate, the drive plate being manually operable against the first spring to disengage it from the ratchet, and a cam on the lever for disengaging the latching plate from the ratchet after the drive plate has encountered and rides along a radius plate fixed in the mounting to hold the drive plate clear of the ratchet when unwinding of the strap from the spool is required, further characterized in that instead of the strap being wound on the spool, a circumferential groove is provided in the spool in which is reeved and wound one end of the wire the other end of which is secured to the pulley for effecting rotation of the slotted crossbar on to which the strapping strand is wound.

10. A cap as in Claim 8 or Claim 9, characterized in that the lever and ratchet mechanism is made wholly or principally of metal.

11. A cap as in Claim 8 or Claim 9, characterized in that there is provided a lever and ratchet mechanism made wholly or principally of plastics material.

12. A cap as in Claim 8 or Claim 11, characterized in that there is provided a bifurcated lever, a spool with a ratchet extending from one end to a circumferential groove adjacent the other end into which the wire is reeved, the lever and the spool being rotatable about a fixed common axis in the housing and the lever being rotatable with respect to the spool, a ratchet drive pawl on a first resilient arm mounted in the lever, a latching pawl on a second resilient arm mounted in the housing to latch the ratchet at times when it is not being rotated by the driving action

of the lever through the drive pawl, a fixed stop in the housing for limiting swinging of the lever from inoperative position, manually operable means for disengaging the drive pawl from the ratchet, and a cam on the lever for disengaging the latching pawl from the ratchet after the drive pawl has encountered and rides along a fixed radius plate in the housing beyond the stop means.

13. A cap as in Claim 12 in combination with Claim 3, characterized in that the return spring is a torsion spring coiled about the lever and spool pivot and with end arms abutting projections on the lever and within the housing respectively.

14. A cap as in Claim 12 or Claim 13, characterized in that the manually operable means for disengaging the drive pawl from the ratchet comprises a slider movable in the lever towards and away from the drive pawl, with a head on a neck passing through a slot in the first resilient arm, the head having lateral projections engaging ramps on each side of the slot when the slider is moved towards the drive pawl.

15. A cap as in Claim 14, characterized in that there is provided a fixed abutment in the housing spaced from the fixed stop to be engaged by the slider to urge it back towards its inoperative position as the drive pawl rides along the radius plate.

16. A cap as in any one of Claims 12 to 15, characterized in that there is provided a plate or spaced abutments on the lever to lie alongside the second resilient arm when the lever is moved into inoperative position, to ensure that the latching pawl cannot be unintentionally disengaged from the ratchet.

17. A cap as in any one of Claims 12 to 16, characterized in that torque limiting means is incorporated in the lever to ensure that the wire cannot be overloaded.

18. A cap as in any one of Claims 1 to 17, characterized in that each strapping strand is a strap having its end remote from the hook secured to the barrel of a drum, with a spring within the drum for retracting the strap when it is free to run through the slotted crossbar.

19. A cap as in Claim 18, characterized in that the drum is on an axis perpendicular to the general plane of the cap and the strap twists through 90° between the drum and the slotted crossbar.

20. A cap as in Claim 19, characterized in that each housing has a depth little more than the height of the drum.

21. A cap as in Claim 20, characterized in that the drum has thin flanges at the ends of its barrel.

22. A cap as in any one of Claims 1 to 21, characterized in that each hook has two prongs spaced apart so as to fit one to each side of a middle spacer of a pallet.

23. A cap as in any one of Claims 1 to 22, characterized in that each opening is provided at the back of a recess in the respective side of the cap of a depth front-to-back to receive fully the respective hook, and the bottom of the recess provided with ramping surfaces to effect automatic parking of the hook into the recess upon retraction of the strap into the housing and retention of the hook against dislodgement when the cap is turned over; and the lever is located within a slot in the respective side of the cap extending from the recess.

24. A cap as in any one of Claims 1 to 23, characterized in that to suit different widths of middle spacers in pallets different sizes of hook may be made available with different spacings between the prongs, for location closely to each side of the respective width spacer, each prong being cranked out from a mid-portion of the hook of a width commensurate with the width of the strap secured around it.

25. A cap as in any one of Claims 1 to 23, characterized in that to accommodate different widths of middle spacers in pallets a single size of hook is provided with a spacing between the prongs for location closely to each side of the widest middle spacer in use.

26. A cap as in Claim 24 or Claim 25, characterized in that each hook is provided with a bracing bar parallel to the mid-portion to aid placement onto a pallet by the toe of footwear of a user.

27. A cap as in Claim 26, characterized in that the strap extends beyond the bracing bar for grasping by a user's hand for effecting withdrawal of the hook from its recess.

28. A cap as in Claim 26, characterized in that the strap terminates at the mid-portion of the hook and a separate tab is provided on the bracing bar for grasping by a user's hand for effecting withdrawal of the hook from its recess.

29. A cap as in any one of Claims 1 to 28, characterized in that the bulk of the cap is formed of plastics material, with a main moulding forming a lower portion, sides and a skirt, one or more mouldings forming an upper portion, and with integral wall formations on the upperside of the lower portion defining the housings.

30. A cap as in Claim 29, characterized in that the skirt is stepped outwardly from side portions of the cap to enable like caps to be nested with each other and/or with pallets during return transporting as well as to help secure a load on a pallet by embracing the top sides of the load.

31. A cap as in Claim 29 of Claim 30, characterized in that the centre of the upper portion of the cap is provided with an opening spanned by a bar handle, to facilitate manual handling of the cap, particularly onto and off loads on pallets, the central opening being located above a continuous wall upstanding from the lower portion, to prevent water or dirt entering the space between the mouldings occupied by the strapping mechanisms.

32. A cap as in Claim 30 or Claim 31, characterized in that one or more handholds are provided at each side of the cap.

33. A cap as in Claim 32, characterized in that a handhold is provided adjacent each corner.

34. A cap as in any one of Claims 29 to 31, characterized in that a slot is provided in each side of the skirt.

35. A cap as in any one of Claims 1 to 34, characterized in that two strapping strands are provided for use with a 2-way or 4-way pallet.

36. A cap as in any one of Claims 1 to 34, characterized in that four strapping strands are provided especially for use with a 4-way pallet but capable of being used with a 2-way pallet by utilising only two opposite strapping strands or all four.

37. A cap as in any one of Claims 1 to 36, characterized in that the underside of the cap is slightly domed, being slightly lower at the corners than at the

centre, so that with strapping strands at the middle of sides of the cap under tension tending to cause bowing, the doming will distribute the loading of the cap more evenly across the top of the load on the pallet to which the cap is applied and the straps are hooked respectively.

38. A cap as in any one of Claims 1 to 36, characterized in that the underside of the cap is provided with pads adjacent the corners, so that with strapping strands at the middle of sides of the cap under tension tending to cause bowing, the pads will distribute the loading of the cap more evenly across the top of the load on the pallet to which the cap is applied and the straps are hooked respectively.

39. A cassette for incorporation in a cap for use on palletized loads, the cassette comprising a chassis and a cover, a strapping strand retractable into the cassette through an opening in the cassette, spring means within the cassette for retracting the strapping strand, a hook on the free end of the strapping strand for engagement with the underside of the platform of a pallet, stop means for limiting retraction of the hook into the cassette when not engaged with a pallet, and tensioning means within the cassette for tightening the strapping strand after interposing a load between a pallet and a cap incorporating the cassette, the tensioning means comprising a slotted crossbar through which the strapping strand passes, a lever pivoted within a side of the cassette and movable in a plane parallel to the general plane of the cassette between operative and inoperative positions, and linkage between the lever and the slotted crossbar such that movement of the lever from inoperative position to operative position causes rotation of the slotted crossbar to wind the strapping strand round the slotted crossbar, together with

manually releasable spring-loaded latch means for securing the strapping strand in tension.

40. A cassette as in Claim 39, characterized in that a return spring is provided to urge the lever to inoperative position.

41. A cassette as in Claim 39 or Claim 40 characterized in that the axis of rotation of the slotted crossbar is at the middle of the slot.

42. A cassette as in Claim 41, characterized in that the slotted crossbar is part of a spindle having journals for rotation in bearings formed between upstanding formations on the chassis and depending formations on the cover.

43. A cassette as in Claim 42, characterized in that a pulley is also provided as part of the spindle, and a wire is secured at one end to the lever and at the other end to the pulley, about which the wire is wound, movement of the lever from inoperative position to operative position effecting unwinding of the wire from the pulley to cause winding of the strapping strand round the slotted crossbar, together with a return spring for re-winding the wire onto the pulley when the spring-loaded latch means is manually released to release tension in the wire.

44. A cassette as in any one of Claims 39 to 43, characterized in that a ratchet mechanism is incorporated in the linkage between the lever and the slotted crossbar, to enable repeated swinging of the lever to-and-fro to effect as many turns of the strapping strand round the slotted crossbar as may be needed for adequate tensioning of the strapping strand.

45. A cassette as in Claim 44 in combination with Claim 43, characterized in that the lever is bifurcated and there is provided a spool with a ratchet extending from one end to a circumferential groove adjacent the other end into which the wire

from the pulley is reeved. The lever and the spool being rotatable about a fixed common axis in the cassette and the lever being rotatable with respect to the spool, a ratchet drive pawl on a first resilient arm mounted in the lever, a latching pawl on a second resilient arm mounted in the chassis to latch the ratchet at times when it is not being rotated by the driving action of the lever through the drive pawl, a fixed stop on the chassis for limiting swinging of the lever from inoperative position, manually operable means on the lever for disengaging the drive pawl from the ratchet, and a cam on the lever for disengaging the latching pawl from the ratchet after the drive pawl has encountered and rides along a fixed radius plate on the chassis beyond the stop means.

46. A cassette as in Claim 45, characterized in that a return spring for the lever is in the form of a torsion spring coiled about the lever and spool pivot and with end arms abutting projections on the lever and cover respectively.

47. A cassette as in Claim 45 or Claim 46, characterized in that the manually operable means for disengaging the drive pawl from the ratchet comprises a slider movable in the lever towards and away from the drive pawl, with a head on a neck passing through a slot in the first resilient arm, the head having lateral projections engaging ramps on each side of the slot when the slide is moved towards the drive pawl.

48. A cassette as in Claim 47, characterized in that a fixed abutment is provided on the chassis spaced from the fixed stop to be engaged by the slider to urge it back towards its inoperative position as the drive pawl rides along the radius plate.

49. A cassette as in any one of Claims 39 to 48, characterized in that the strapping strand is a strap having its end remote from the hook secured to the barrel of a drum, with a spring within the drum for retracting the strap when it is free to run through the slotted crossbar.

50. A cassette as in Claim 49 characterized in that the drum is on an axis perpendicular to the general plane of the cassette and the strap twists through 90° between the drum and the slotted crossbar.

51. A cassette as in Claim 50, characterized in that the drum has thin flanges at the ends of its barrel.

52. A cassette as in any one of Claims 39 to 51, characterized in that the opening in the cassette for passage of the strapping strand is at the back of a recess in the cassette of a depth front-to-back to receive fully the respective hook, and the bottom of the recess is provided with ramping surfaces to effect automatic parking of the hook into the recess upon retraction of the strapping strand into the cassette.

53. A cassette as in any one of Claims 39 to 52, characterized in that the hook as two prongs spaced apart for location to each side of a middle spacer of a pallet and cranked out from a mid-portion of the hook commensurate with the width of the strapping strand secured around it.

54. A cassette as in Claim 53, characterized in that the hook is provided with a bracing bar parallel to the mid-portion to aid placement on to a pallet by the toe of footwear of a user.

55. A cassette as in Claim 54, characterized in that the strapping strand extends beyond the bracing bar for grasping by a user's hand.

56. A cassette as in Claim 54, characterized in that the strapping strand terminates at the mid-portion of the hook and a separate tab is provided on the bracing bar for grasping by a user's hand.

57. A cap for use on palletized loads substantially as hereinbefore described with reference to the accompanying drawings.

58. A cassette substantially as hereinbefore described with reference to Figures 9 to 30 of the accompanying drawings.